

Assessing Children's Sense
Making Strategies Using
Cognitively Guided Instruction

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Dandelion Problem:

How would you expect a child in first grade to solve the following problem?

*You have six dandelions. How many more do you
need to pick to have 11 dandelions?*

Possible Strategies:

Aaliyah's Strategy:

Which problem would be more difficult for children in kindergarten or 1st grade to solve?

- A. Serenity had 17 animal crackers. Her brother ate some animal crackers. Now she has 15 animal crackers. How many animal crackers did her brother eat?
- B. Kevin had some toy cars. Then he went to the store and bought 6 more toy cars. Now he has 15 toy cars. How many toy cars did he have to start with?

How does the first grader solve each of these problems?

Addition/Subtraction Problem Types*

	Result Unknown	Change Unknown	Start Unknown
Join		You have six dandelions. How many more do you need to pick to have 11 dandelions?	Kevin had some toy cars. Then he went to the store and bought six more toy cars. Now he has 15 toy cars. How many toy cars did he have to start with?
Separate		Serenity had 17 animal crackers. Her brother ate some animal crackers. Now she has 15 animal crackers. How many animal crackers did her brother eat?	
Part – Part Whole			
Compare			

*Problem type structure, *Children's Mathematics* (Carpenter, et al., 2015)

What are some ways that children might solve the “bus” problem? What might a direct modeling strategy look like?

*Nineteen children are taking a bus to the zoo.
The children must sit either two or three to a seat.
If there are seven seats total, how many children
must ride three to a seat and
how many children can ride two to a seat?*

Possible Strategies:

Selected CGI Research Findings – Kindergarten Study (Carpenter, et al, 1993)

In the study of seventy kindergarten children from CGI classes:

- Thirty-two children used a valid strategy for all nine problems that included addition, subtraction, multiplication, and division problem types
- Thirty-five children solved the bus problem correctly
- Forty-four children correctly answered seven or more problems
- Five children were not able to answer any questions
- Most children solved problems by representing the action or relationship shown in the problem (direct modeling)

Resources:

Carpenter, T. P., Ansell, E., Franke, M. L., Fennema, E., & Weisbeck, L. (1993). Models of problem solving: A study of kindergarten children's problem-solving processes. *Journal for Research in Mathematics Education*, 428-441.

Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., & Empson, S. B. (2015). *Children's Mathematics: Cognitively Guided Instruction* (2nd ed.). Portsmouth, NH: Heinemann.

For more information about *Cognitively Guided Instruction* contact: Linda Levi, Director of CGI Initiatives, linda.levi@teachersdg.org